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A FIELD COMPARISON OF 0.20, 0.35, AND 0.50 PERCENT STRYCHNINE GRAIN BAITS FOR CONTROLLING BLACK-TAILED PRAIRIE DOGS

by

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ABSTRACT

A field investigation conducted in Petroleum County, Montana, during August 1981, determined that strychnine grain bait containing 0.20 percent active ingredient was not as effective as 0.35 and 0.50 percent baits in reducing prairie dog numbers. Four non-target species horned lark, carcasses were found on the treated plots.

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INTRODUCTION

In 1976, strychnine, as a field rodenticide, was placed in the Rebuttable Presumption Against Registration (RPAR) process because of potential hazards to non-target species, accident history, and acute oral toxicity. As a result, in 1980, the U.S. Environmental Protection Agency released the Strychnine Position Document 2/3 (U.S. Environmental Protection Agency 1980) with recommendations concerning the continued above ground uses of strychnine. Among EPA's recommendations were standardization of ground squirrel baits at 0.20 percent strychnine and cancellation of strychnine for prairie dog control. Montana agricultural interests are concerned that the recommended concentration would not be efficacious, and that alternative rodenticides for prairie dog control are ineffective. Several Montana agencies requested that EPA dalay its final decision until studies could be conducted to investigate effective concentrations and rates of application.

Strychnine grain baits currently registered in Montana have concentrations of 0.35, 0.44, and 0.50 percent active ingredient. The application rate is one tablespoon per burrow for prairie dogs. These baits provide the only effective and economical method for managing black-tailed prairie dogs at this time. Alternatives including zinc phosphide, anticoagulants, 1080, and gas cartridges have been ineffective, unproven, not registered, or too expensive (Swick 1976, Sullins 1977, Albert and Record 1979, Swick 1980). Zinc phosphide, an alternative toxicant, required prebaiting which adds significantly to the cost of control. Until such time as viable alternatives are developed and registered, it is imperative that strychnine bait be available for management of damage caused by black-tailed prairie dogs.

This study was conducted to determine if 0.20 percent strychnine bait would provide economic control of black-tailed prairie dogs. Several currently used strychnine concentrations were tested along with EPA's recommended 0.20 percent.

OBJECTIVES

The objectives of this study were to determine which of the efficacies of 0.20, 0.35, and 0.50 percent strychnine grain baits would provide acceptable reduction in prairie dog numbers and to observe the effects of bait application on non-target species.

STUDY AREA

Seven plots were selected on privately owned property approximately 8 miles south of Winnett, Montana. The plots were located on dryland pasture and were similar in vegetation type and physical aspects. Unusually wet spring and early summer conditions (over twice the normal amount of precipitation) resulted in above normal amounts of vegetation on the study area.

METHODS AND MATERIALS

Using three concentrations of strychnine grain bait, 0.20, 0.35, and 0.50 percent active ingredient on slightly crimped oats (formulated and produced by the South Dakota Department of Agriculture Pierre, South Dakota) field efficacy tests were conducted on six separate plots (two replications for each concentration) inhabited by black-tailed prairie dogs. A seventh plot received no treatment and was used as a control. Plot size was approximately 3.3 hectares (8.2 acres). All treated plots were prebaited with nontoxic whole oats 3 days

prior to bait application. Prebait and baits were applied by motorcycle dispenser (Sullins 1979) at the rate of one tablespoon per burrow as per label instructions. These baits were applied in mid-August after juveniles reached adult size.

To quantify the effectiveness of each treatment, visual counts with binoculars were conducted pre-and-post treatment to generate activity indices(AI). Visual counts consisted of three counts at five minute intervals on each plot for three consecutive days pre-and-post treatment. Counts were conducted early in the morning during peak periods of foraging activity. Activity indices were then computed by the following formula:

$$\text{Percent Reduction} = \frac{\text{Pretreatment AI - Post-treatment AI}}{\text{Pretreatment AI}} \text{ X } 100$$

Post baiting searches were conducted to determine non-target mortalities resulting from strychnine poisoning.

RESULTS AND DISCUSSION

A comparison of pre-and-post treatment activity indices (Table 1) indicates that the tested strychnine grain baits reduced black-tailed prairie dog activity within a range of 59.0 to 98.8 percent. The 0.20 percent treatment (59.0 and 76.0 percent reduction) was much less effective than the 0.35 (98.8 and 76.7 percent reduction) percent and 0.50 (86.4 and 88.6 percent reduction) percent treatments. Prairie dog activity was observed to decline rapidly one day post-treatment on all treated plots but rose again on the 0.20 percent treatment. Apparently, a sub-lethal dose was received by many of the prairie dogs consuming the 0.20 percent bait. Temporary illness after consuming sublethal bait could produce a conditioning or "bait shyness" toward grain baits and adversely affect future control efforts.

Environmental conditions were considered good for this study, although considerable amounts of green vegetation were present on the study plots. The control plot was treated with 0.50 percent strychnine bait (no prebait) after completion of the study and only a 55.2 percent reduction in activity was achieved, indicating that prebaiting may be advantageous when green vegetation is present.

Post-treatment searches revealed four horned lark carcasses (0.35 percent plots). Six prairie dog carcasses were found above ground.

CONCLUSIONS

This study indicated that strychnine grain bait containing 0.20 percent active ingredient was not effective in reducing prairie dog numbers. If a near 90 percent reduction in rodent populations is necessary to achieve satisfactory relief from economic damage (Marsh 1967), 0.20 percent strychnine bait was unsatisfactory even under good environmental conditions and with the use of prebait. The presence of green vegetation may have also effected acceptance of the 0.35 and 0.50 percent baits since average reduction was slightly less than 90 percent.

Further testing may be needed to observe the efficacy of baits with concentrations greater than 0.20 but less than 0.35 percent strychnine.

TABLE 1. ACTIVIEY INDICES, PERCENT REDUCTION IN ACTIVITY, AND NON-TARGET SPECIES EFFECT ON PLOTS TREATED WITH 0.20, 0.35, AND 0.50 PERCENT STRYCHNINE GRAIN BAITS TO CONTROL BLACK-TAILED PRAIRIE DOGS. (August 1981)

	TREATMENT						
	Control	0.20% Strychnine 1 Tablespoon per burrow		0.35% Strychnine 1 Teaspoon per burrow		0.50% Strychnine 1 Teaspoon per burrow	
INDICES		Plot A	Plot B	Plot A	Plot B	Plot A	Plot B
Pre-Treatment Activity Index[a]	16.3	25.6	24.2	45.3	20.2	27.9	43.9
Post-Treatment Activity Index[b]	16.0	10.5	5.8	1.0	4.7	3.8	5.0
Percent Reduction[c]	--	59.0	76.0	98.8	76.7	86.4	88.6
Non-Target Species[d]	--	--	--	2 horned larks	2 horned larks	--	--

a) Average of 9 counts of active prairie dogs per plot during 3 days prior to baiting.
b) Average of 9 counts of active prairie dogs per plot during 3 days after baiting.
c) Formula: $\frac{\text{Pre-Treatment AI - Post-Treatment AI}}{\text{Pre-Treatment AI}} \times 100$
d) Non-target species carcasses found on or near treated plots within 3 days after baiting.

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